

The classification of some Australian species currently included in *Helipterum* and *Helichrysum* (Asteraceae: Gnaphalieae): Part 3 *Anemocarpa* and *Argentipallium*, two new genera from Australia

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Abstract

Wilson, Paul G. The classification of some Australian species currently included in *Helipterum* and *Helichrysum* (Asteraceae: Gnaphalieae): Part 3 *Anemocarpa* and *Argentipallium*, two new genera from Australia. Nuytsia 8(3): 447-460 (1992). Two new genera *Anemocarpa* and *Argentipallium* are described in the Gnaphalieae: Angianthinae. The first genus is based on a new species *Anemocarpa calcicola* from Western Australia and includes two other species: *A. podolepidium* [*Helichrysum podolepidium* F. Muell.], and *A. saxatilis* [*Helipterum saxatile* Paul G. Wilson]; it is apparently most closely related to the genera *Leucochrysum* (DC.) Paul G. Wilson and *Chrysocephalum* Walp. The second genus is based on *Argentipallium obtusifolium* (Sonder) Paul G. Wilson [*Helichrysum obtusifolium* Sonder] and includes five other species: *A. blandowskianum* [*Helichrysum blandowskianum* Sonder], *A. dealbatum* [*Helichrysum dealbatum* Labill.], *A. niveum* [*Helipterum niveum* Steetz], *A. spicieri* [*Helichrysum spicieri* F. Muell.], and *A. tephrodes* [*Ozothamnus tephrodes* Turcz.]; it is evidently most closely related to *Ozothamnus* R.Br.

Introduction

The circumscription of the genera *Helipterum* DC. and *Helichrysum* Miller in Australia has been discussed in several recent papers (Hilliard & Burt 1981, Wilson 1989, Anderberg 1991), where it has been demonstrated that these genera, in the strict sense, do not occur in Australia and that the Australian species previously included in them should be placed in a number of distinct genera. Anderberg, *op. cit.*, further indicated that the genera *Lawrencella* Lindley and *Rhodanthe* Lindley were polyphyletic as circumscribed in his treatment and needed further study.

In this paper I am describing two new genera. The first, *Anemocarpa*, includes one species placed by Anderberg in the '*Rhodanthe*' assemblage and one placed by him in *Chrysocephalum* Walp. The second, *Argentipallium*, contains six species, four of which were placed by Anderberg in the *Lawrencella* '*Scorpioides*' complex. Prior to Anderberg's assessment the species involved in the two new genera had been treated as belonging to either *Helichrysum* or *Helipterum*. Eventually it is probable that further species currently placed in *Helichrysum* will be transferred to one or other of the new genera. The correct circumscription and nomenclature of these additional species has still

to be elucidated, a task that will entail further research and will involve the study of material in Australian and overseas herbaria; for these reasons only those species are treated whose names are required in regional floras and whose taxonomy and nomenclature is clear.

Methods

Dissections of achenes, florets, and involucre bracts of representative Australian species of '*Helipterum*', '*Helichrysum*', and of related genera have been mounted in Hoyer's solution (King & Robinson 1970) and examined under the stereo and high-powered microscope. Achenes have also been embedded in Spurr's low-viscosity embedding media and sections stained in Toluidine Blue. In addition microscope slides were studied of transverse sections of achenes, some of which were prepared by P.S. Short, K.E. Wilson and J. Nailon for their paper (1989) on achene anatomy while others were prepared for me by my colleagues R. Cranfield and C. Parker.

Morphological studies

The morphological characters used in discriminating the genera and species have been described (or references given to their description) in a number of earlier papers (e.g. Wilson 1989, 1992b); supplementary notes are here provided on some of these characters.

Achenial hairs. The nature of the hairs or papillae on the achenes was studied. Various types of hairs and papillae found in the Gnaphalieae have been described by Anderberg (1991) and their taxonomic significance assessed. In the '*Helichrysum elatum*' group an additional 'papilla' type has been observed, in this two cells of the pericarp epidermis are laterally instead of vertically placed; they are transparent and often myxogenic. Papillae of this type are referred to as 2-celled fenestrac*. In some species of this group the fenestrae apparently consist of only one longitudinally elongated cell, this cell is usually not myxogenic and is not raised above the surface of the achene.

In *Anemocarpa* low, rounded, 2-celled papillae are present with the lower cell slightly exceeding the upper. This papilla type, which was described by Anderberg (1991), is comparable to that found in the *Waitzia* group of genera.

In *Argentipallium* short narrow-obovoid duplex hairs are present; these are similar to the more elongated duplex hair type that is found in *Ozothamnus*.

Achenial nervation. The vasculature of the achene can be determined by mounting it in Hoyer's solution. Where the testa is free from the pericarp, or where it can be readily separated from it, the vasculature is preferably examined in an achene in which the seed (i.e. testa, endosperm, and embryo) has been removed. In all Australian members of the Gnaphalieae where this organ has been studied, with the exception of *Myriocephalus guerinae* F. Muell. (see Short *et al.* 1989), there are two vascular strands in the pericarp. In the testa there is always one strand and this passes for a varying degree longitudinally around the seed; it is best observed by studying a whole mount of the testa from which the embryo and endosperm (which is usually \pm free from the testa) have been removed.

* This 'papilla' type is also found in *Bracteantha* as is noted by E.E. Georgeadou Tvrtkovic-Sahin (1982) who refers to them as '2-celled idioblasts'. It is anticipated that these will be more fully described, and their taxonomic significance assessed by her in a forthcoming paper.

The position of the vascular strands of the testa and pericarp relative to the cotyledons of the embryo is of generic significance (Short *et al. op. cit.*) and may be determined by examining transverse sections of the achene, by examining cleared whole mounts (if these are sufficiently transparent), or by dissecting the achene. Their position has been observed in representative species of all of the genera or species-groups discussed in this paper.

In *Anemocarpa* the achenial vascular strands are laterally placed in relation to the cotyledons as they are in its putative closest relatives *Waitzia* Wendl. and *Leucochrysum* (DC.) Paul G. Wilson. They are also laterally placed in species of the *Helichrysum elatum* group.

In *Argentipallium* the vascular strands are medially placed, which is also the case in *Ozothamnus* R.Br.

Involucral bracts. The cartilaginous basal portion of the involucral bracts, the stereome, was first critically described by Drury (1970). He pointed out that in some genera the stereome is not entire and that unthickened translucent areas, here referred to as 'fenestrae', are present between the thickened opaque regions. This character has been used by Hilliard and Burt (1981) and by Anderberg (1991) to assist in the segregation of species into discrete genera in the *Gnaphalium* - *Helichrysum* complex. The Australian species of this complex are also amenable to this procedure. The species of the genus *Argentipallium* have fenestrate stereomes whereas species of *Anemocarpa* and of the *Helichrysum elatum* group do not. In the genus *Ozothamnus*, as currently circumscribed (Anderberg 1991), some species appear to have fenestrate stereomes while others do not.

Pappus. In *Anemocarpa* the pappus bristles are free and persistent but they eventually break c. 1 mm above the base in the same manner as do the bristles in species of the *Helichrysum elatum* group and of *Leucochrysum*. The bristles are barbellate upwards with the terminal barbellae congested and prominent but not thickened.

In *Argentipallium* the bristles are very shortly united, are persistent, and do not break above base. They are barbellate upwards with the terminal barbellae clavate and thickened. This situation is similar to that found in *Ozothamnus*.

Mycorrhizal associations. It has been shown by Wareup (1990) that only about half of the Australian species that had been previously included in either *Helipterum* or *Helichrysum* form ectomycorrhiza. Wareup pointed out that this was unusual since, in general, species of a composite genus are usually either all ectomycorrhizal or all non-ectomycorrhizal. However, when the species are segregated into the genera recognised by Anderberg (1991) and by myself these segregate genera have so far been found to contain only ectomycorrhizal or only non-ectomycorrhizal species. Unfortunately only a few species involved in the present study have been tested.

Helichrysum podolepidium F. Muell. (*Anemocarpa*) was found not to form ectomycorrhiza. This contrasts with species in the putatively closely related genera *Leucochrysum* and *Waitzia* that form ectomycorrhiza. It also contrasts with species of *Chrysocephalum* in which genus *H. podolepidium* was placed by Anderberg (1991).

Helichrysum dealbatum Labill. and *H. blandowskianum* Sonder (both *Argentipallium*) form ectomycorrhiza, while species in the morphologically similar genus *Ozothamnus* do not.

Generic studies

In a recent paper Anderberg (1991) recognised the genera *Chrysocephalum* Walp., *Bracteantha* Anderb., *Ozothamnus* R.Br., and *Lawrencella* Lindley *sensu lato* as segregates of (Australian) *Helichrysum*. I have reclassified the taxa in the *Lawrencella* complex (Wilson 1992a) and most of the Australian representatives of *Helipterum* (Wilson 1992a,b). This leaves a number of Australian species of *Helichrysum* and of *Helipterum* that still require generic classification; they are as follows:-

1) The '*Helichrysum elatum*' group. Species in which the involucre bracts have terete or semi-terete stipes and are not fenestrate, the anther apicula have thick cell walls, the style appendages are ovate to acuminate, and the achenes are glabrous with a smooth crustaceous pericarp in which the vascular strands are laterally positioned. The epicarp has longitudinal 2-celled fenestrae (idioblasts) of the *Bracteantha* type. The group is represented by such species as *H. elatum* DC., *H. boormanii* Maiden & Betche, and *H. adenophorum* F. Muell. It corresponds to *Helichrysum* sect. *Blepharolepis* DC. *pro parte* and, from the few species investigated (Warcup 1990), is evidently not ectomycorrhizal.

2) The '*Helipterum saxatile*' group. Species similar in most characters to those in group 1 but with thin anther apicula, rounded style apex, and papillose achenes (the two cells of the papillae vertically positioned) with a thin pericarp. This group is represented by *Helipterum saxatile* Paul G. Wilson, *Helichrysum podolepidium* F. Muell., and an undescribed species. The species are here placed in the new genus *Anemocarpa*. It is possible that it will have to be enlarged to include species at present in group 1.

3) The '*Helichrysum dealbatum*' group. Species with a flattened claw to the involucre bracts, fenestrate stereome, thin anther apicula, truncate to rounded style apices, short clavate to obovoid duplex hairs on the achenes, a diaphanous pericarp, and a leathery testa, with the achenial vascular strands medially positioned. These species form ectomycorrhiza. To this group belong *Helichrysum dealbatum* Labill., *H. spiceri* F. Muell., *Ozothamnus tephrodes* Turcz., *Helichrysum obtusifolium* Sonder, and *Helipterum niveum* Steetz; they are here placed in the new genus *Argentipallium*.

4) *H. oligochaetum* F. Muell. This species appears to have no near relatives in the '*Helichrysum*' group and is possibly best placed in close association with *Rhodanthe*.

5) *Helichrysum pumilum* J.D. Hook. A species with the habit of *Leucochrysum albicans* (A.Cunn.) Paul G. Wilson but with florets similar to some species of *Rhodanthe* particularly in having villous achenes; it differs in having heterogamous capitula, thick branched anther tails, deeply stained corollas, and barbellate pappus bristles.

6) *Helichrysum leucopsideum* DC. A rhizomatous species with the appearance of certain species in the '*Helichrysum elatum*' group. Its florets are similar to those in *Bracteantha* but have a rounded style apex, a smooth glabrous cylindrical achene without fenestrae or myxogenic cells, and a double pappus that is persistent. The vascular strands of the pericarp and testa are medially orientated relative to the cotyledons whereas in *Bracteantha* they are laterally orientated (Short 1989). This is the only Australian species in the '*Helipterum - Helichrysum*' complex in which the pappus is double and it is the only species that is recorded as being rhizomatous.

Key to genera

The genera discussed in this paper may be distinguished by the following synoptic key:-

1. Annual herbs; involucre bracts with flattened proximal portion, stereome not fenestrate; anther appendage with proximal cells equilateral and thick-walled, distal cells narrow-oblong and thin-walled; style apex deltoid; pappus bristles evenly barbellate or cilia longer near base; achene villous or hispid with large thick duplex hairs; ectomycorrhiza absent *Lawrencella* group
2. Base of achene prominently excavated; vascular strands (v.s.) of pericarp and testa lateral
 3. Radiant petaloid involucre bracts absent; leaves terete, strictly basal *Bellida*
 3. Radiant petaloid involucre bracts present; leaves various, sub-basal or cauline *Lawrencella*
2. Base of achene minute, scarcely excavated; v.s. of pericarp and testa medial *Schoenia*
1. Perennial herbs or shrubs; involucre bracts with flattened or stipe-like proximal portion, fenestrate or not; anther appendage with proximal cells narrow-oblong and similar to distal cells; style apex truncate or rounded to acuminate; pappus bristles barbellate or plumose, smooth near base; achene glabrous, papillose, or with very small or weak duplex hairs; ectomycorrhiza present or absent
 4. Achenes with short clavate duplex hairs; pericarp thin, transparent, v.s. medial; involucre bracts papery, fenestrate; anther tails long and slender exceeding the collar; pappus persistent; ectomycorrhiza present; perennial herbs *Argentipallium*
 4. Achenes glabrous or minutely papillose, or with short slender duplex hairs; v.s. of pericarp medial or lateral; involucre bracts glumaceous or papery, not fenestrate; pappus persistent or caducous; ectomycorrhiza present or absent; shrubs or perennial herbs
 5. Shrubs; capitula small and clustered; involucre bracts papery; style apex truncate; achene with short narrow duplex hairs or glabrous, v.s. of pericarp medial; pappus persistent; ectomycorrhiza absent *Ozothamnus*
 5. Perennial herbs; capitula solitary or clustered; style various; achenes smooth or minutely papillose, v.s. of pericarp lateral; pappus persistent or caducous; ectomycorrhiza present or absent
6. Intermediate involucre bracts with a flattened proximal portion; ectomycorrhiza present
 7. Achenes with papillae consisting of two cells of which the lower overtops the upper; involucre bracts papery, strongly ciliate; style apex truncate; pericarp cartilaginous; pappus persistent *Chrysocephalum*
 7. Achenes smooth and glabrous; involucre bracts glumaceous, entire; style apex acute; pericarp thick and hard; pappus caducous *Bracteantha*
6. Involucre bracts with a stipe-like proximal portion; pappus persistent; ectomycorrhiza present or absent

8. Pappus bristles barbellate; style apex rounded to acuminate, not deltoid; pericarp papery or brittle; ectomycorrhiza absent
9. Pericarp papery; style apex rounded; carpopodium prominent, several cells high *Anemocarpa*
9. Pericarp brittle; style apex ovate to acuminate; carpopodium minute, 1 cell high '*Helichrysum elatum*' group
8. Pappus bristles plumose; style apex broad-deltoid; pericarp thick, cartilaginous; carpopodium minute, 1 cell high; ectomycorrhiza present *Leucochrysum*

Anemocarpa Paul G. Wilson, gen. nov.

Herbae perennes, non-ectomycorrhizales, lanatae. Folia alterna, sessilia. Capitula solitaria. Involucrum hemisphericum. Bractee involucrales chartaceae, anguste ellipticae; bractee interioris parte inferiores semiteretibus, stereomate efenestrato, superiores anguste ellipticae albae. Receptaculum convexum, epaleaceum, glabrum. Flosculi homogami, disciformes. Corolla anguste cylindrica sed versus apicem anguste turbinata, breviter 5-lobata, cellulis faucis undulatis. Caudae antherarum graciles sed firmae. Styli apex rotundatus, nervo prominenti fere ad apicem extenso. Achenium ellipsoideum, glabrum; pericarpium translucens, papillis 2-cellulis ornatum; testa membranacea, crystallina, nervo lateraliter posito; carpopodium multicelluloso altum. Pappi setae persistentes barbellatae, cellulis apicalibus acutis.

Typus: Anemocarpa calcicola Paul G. Wilson

Perennial herbs. Ectomycorrhiza not formed. Plant covered with a woolly indumentum. Leaves alternate, simple, entire, sessile. Capitula solitary and terminal to stems or branches, homogamous, disciform. Involucre hemispherical. Involucral bracts papery, narrow-elliptic; outer bracts pale brown without stipe; inner bracts with proximal portion semi-terete and stipe-like with thickened stereome, not fenestrated, distal portion a white papery lamina, the central vascular strand passing into the lamina; innermost bracts with a linear flattened proximal portion grading into a very short truncate lamina. Receptacle convex, epaleate, glabrous. Corolla narrow-cylindrical, narrow-turbinate towards the apex, regularly shortly 5-lobed, glabrous and smooth within, sparsely glandular pilose outside; cells of inner epidermis of throat undulate. Anther apiculum narrow-triangular; constituent cells narrow-oblong with thickened walls; tails slender, firm, \pm equal to narrow-oblong collar. Style apex rounded, shortly papillate; vascular strand prominent and extending to near tip. Achene ellipsoid, glabrous; pericarp diaphanous to papery and translucent, epidermis with 2-celled myxogenic papillae, the cells separated by a transverse wall, the lower cell slightly exceeding the upper; testa membranous, pale brown, adnate to pericarp, epidermal cells broad-oblong with straight walls, crystals present, vascular strand in lateral position (in relation to cotyledons) and not extending to apex of seed; carpopodium prominent, several cells high. Pappus bristles, free, persistent but eventually breaking c. 1 mm above base, equal to corolla, slender, smooth towards base, barbellate upwards, the terminal barbellae congested, prominent, and acute.

Etymology. The generic name is derived from the Greek words *anema*, without a thread, and *carpos*, fruit, with reference to the absence of hairs on the achenes.

This genus appears to be most closely related to *Leucochrysum*. It shares with that genus lateral vascular strands in the achene, a similar type of pappus, and similar involucre bracts. The genera differ from each other in the shape of the style apex, in the achene morphology (particularly the presence of a prominent carpoidium in *Anemocarpa*), in the presence of 2-celled papillae in *Anemocarpa* and their absence in *Leucochrysum*, and evidently also in their mycorrhizal status (Warcup 1990).

As is mentioned earlier, a number of species additional to those listed here will probably have to be transferred to this genus from *Helichrysum*. However, taxonomic studies on these species is continuing and will be the subject of a later paper. Only those species whose nomenclature and circumscription is clear are presently considered.

Key to species

- 1. Involucre lacking ray bracts *A. podolepidium*
- 1. Involucre with prominent white ray bracts
 - 2. Leaves mostly 5-7 mm long (south coast W.A.) *A. calcicola*
 - 2. Leaves mostly 20-40 mm long (central Australia) *A. saxatilis*

Anemocarpa calcicola Paul G. Wilson, sp. nov. (Figures 1, 2a)

Rami graciles. Folia anguste elliptica, 5-7(12) mm longa, lanata, parum crenulata, marginibus revoluta. Capitula hemispherica, ad 30 mm diam.; bracteae exteriores ovatae, malvinae vel pallide bruneae; interiores lamina anguste elliptica, alba ad 12 mm longa.

Typus: 10 km north of Eyre, 32° 09' S, 126° 17' E, Western Australia, 1 Oct. 1984, *G.J. Keighery* 7533 (holo: PERTH; iso: CANB, K).

Erect perennial to 30 cm high and wide, with a white woolly indumentum on leaves and branches. Branches slender. Leaves cauline, alternate, sessile, narrowly elliptic, 5-7(12) mm long, sparse and small towards the capitula; margins revolute, slightly crenulate; upper surface sparsely woolly; lower surface densely woolly. Capitula hemispherical, to 30 mm diameter; outer bracts sessile, ovate, pale brown or tinged with mauve, inner with narrow elliptic white lamina to 12 mm long, spreading but not reflexed on semiterete claw. Florets numerous. Corolla c. 3 mm long; lobes deltoid c. 0.4 mm long. Anther loculi c. 1 mm long; apiculum c. 0.3 mm long. Achene ellipsoid, 1.5 mm long.

Specimens examined (selection only). WESTERN AUSTRALIA: 6 km north of Eyre, *Demarz* 9760; Baxters Cliffs south of Caiguna, 24 August 1983, *Fitzgerald*; Twilight Cove, *George* 8558; 2 km north-west of Toolina Rockhole, *Keighery & Alford* 635; Telegraph Pass, Hampton Scarp, *Newbey* 11762; Pt Dover, *Wilson* 5917. (All PERTH).

Distribution. Near the south east coast of Western Australia from Toolina Cove (125° E) to Eyre (126° 18'E).

Habitat. Sandy loam over limestone in mallee shrubland or coastal heath.

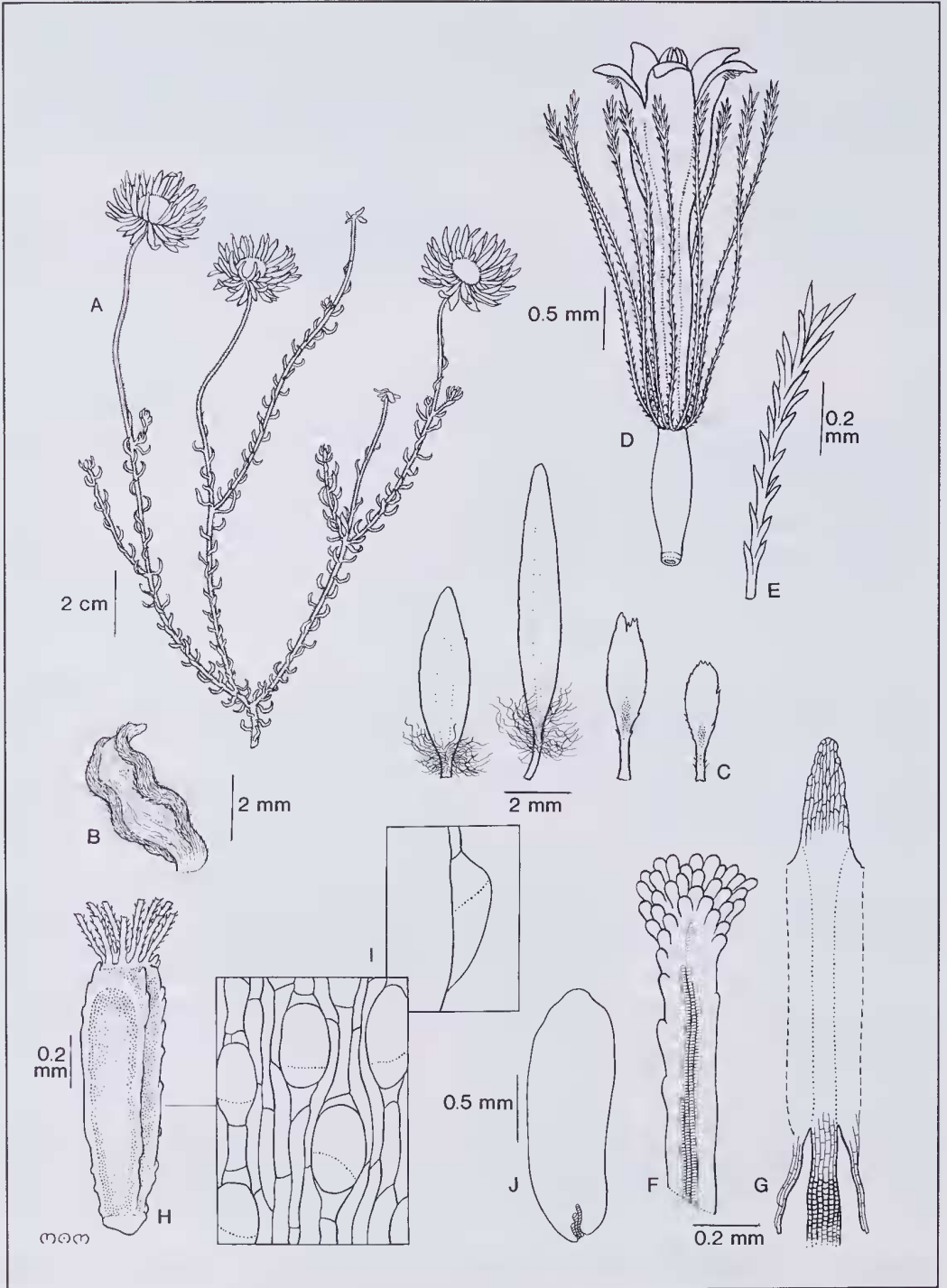


Figure 1. *Anemocarpa calcicola*. A - habit; B - leaf; C - outer, intermediate and inner involucral bracts; D - floret; E - apex of pappus bristle; F - style apex; G - anther; H - achene; I - surface and side views of pericarp showing myxogenic 2-celled papillae; J - seed showing vascular strand. From P.G. Wilson 7693.

Erymology. The specific epithet is derived from the Latin words *calx*, chalk, and *cola*, an inhabitant, with reference to the substrate over which the plant is found.

This species is superficially similar to and has been confused with *Argentipallium obtusifolium* (Sonder) Paul G. Wilson (as *Helichrysum obtusifolium* Sonder), from the latter it differs in the indumentum being woolly (not thick silky), in the involucrel bracts having a semi-terete stipe (not a flattened basal portion), in the lamina of the innermost bracts being very short and truncate (not large and similar to the inner bracts), in the achenes having low rounded 2-celled papillae (not short duplex hairs), and in the anther apiculum being narrow-triangular with thickened cells (not ovate with thin-walled cells). Whereas *Anemocarpa calcicola* is found in south-east Western Australia *Argentipallium obtusifolium* is found in southern eastern Australia to as far west as Eyre Peninsula.

Another superficially similar taxon that has been confused with *H. obtusifolium* is *Argentipallium niveum* (Steetz) Paul G. Wilson [*Helipterum niveum* Steetz]. It is found in the south-west of Western Australia and is readily distinguished from otherwise similar species by its axillary clusters of linear leaves.

Anemocarpa podolepidium (F. Muell.) Paul G. Wilson, comb. nov.

Helichrysum podolepidium F. Muell., Rep. Pl. Babbage Exped. 13(1859). - *Chrysocephalum podolepidium* (F. Muell.) Anderb., Op. Bot. 104:119(1991). *Type*: Wirrawirraloo, 31° 11' S, 136° 41' E, South Australia, 1858, *B.H. Babbage*.

Distribution. Found in southern Northern Territory, north-eastern South Australia, south-west Queensland, and north-west New South Wales.

Anemocarpa saxatilis (Paul G. Wilson) Paul G. Wilson, comb. nov.

Helipterum saxatile Paul G. Wilson, Trans. Roy. Soc. South Australia 83:166(1960). *Type*: Near Hermannsburg, 24 Aug. 1956, *G. Chippendale* 2632 (holo: NT; iso: CANB, NT).

Distribution. Found in southern Northern Territory, northern South Australia, south-west Queensland, and north-west New South Wales.

Argentipallium Paul G. Wilson, gen. nov.

Herbae perennes cum fungis in ectomycorrhiza consociatae, dense sericeae. Folia alterna integra sessilia, linearia vel elliptica. Capitula solitaria. Involucrum hemisphericum vel late turbinatum; bracteae exteriores, chartaceae, anguste ellipticae; bracteae interiores parte inferiores oblongo indurato, lamina chartacea anguste elliptica alba ornatae, stereomate fenestrato; bracteae intimis interioribus similaribus. Receptaculum convexum epaleaccum glabrum. Flosculi homogami vel heterogami cum pauci flosculi feminei, disciformes. Corolla anguste cylindrica vel supra anguste turbinata, 5-lobata. Caudae antherarum graciles, debiles vel firmae. Styli apex truncatus vel rotundatus. Achenium anguste cylindricum, laeve, pilis brevissimis obovoideis ornatum; pericarpium diaphanum; testa membranacea palido brunca, nervo in posito laterali ad apicem seminis extenso. Pappi setae ad basim conatae, ± persistentes, barbellatae, in flosculis femineis paucac vel absentes, barbellis ad apicem plerumque clavatis.

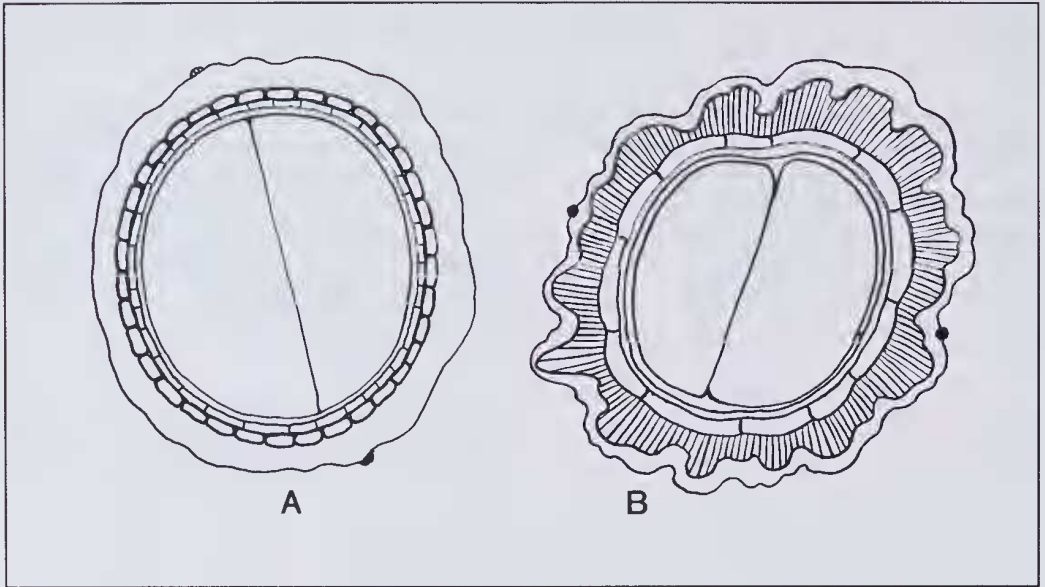


Figure 2. Transverse sections of achenes of A - *Anemocarpa calcicola* and B - *Argentipallium obtusifolium*, both semi-diagrammatic. A from H. Demarz 9760 and B from D. Hunt 3041.

Typus: *Argentipallium obtusifolium* (Sonder) Paul G. Wilson

Perennial herbs. Ectomycorrhiza formed. Plant covered with a dense silvery silky indumentum. Leaves alternate, simple, entire, sessile, linear to elliptic. Capitula solitary and terminal to stems or branches or in loose terminal panicles, homogamous or heterogamous, disciform. Involucre hemispherical to broad-turbinate. Involucral bracts papery, narrow-elliptic; outer bracts pale brown without lamina; inner bracts with proximal portion flat and grading into the white lamina; stereome flat, fenestrate, grading into the surrounding bract tissue, the vascular tissue not passing into the lamina; innermost bracts similar to the inner bracts. Receptacle convex, epaleate, glabrous. Female florets few or absent, with filiform corollas and few or no pappus bristles; achene as in disc florets. Disc florets perfect. Corolla narrow-cylindrical or upper portion turbinate, regularly 5-lobed; vascular strands not passing into lobes. Anther apiculum oblong to elliptic, thin; constituent cells narrow-oblong, not thickened, the marginal ones differentiated or not. Anther tails slender, shortly branched, weak or firm, equal to or exceeding collar. Anther collar narrow-oblong. Style apex truncate or rounded, shortly papillate; vascular strand either slender and ending well below apex or thick and extending to near tip. Achene terete; surface smooth; indumentum sparse or dense, of short (0.05-0.15 mm long) obovoid duplex hairs; pericarp diaphanous; testa membranous, pale brown, adnate to pericarp, cells broad-oblong, vascular strand in lateral position (in relation to cotyledons) and extending to apex of seed; carpodium several cells high. Pappus bristles free or fused towards base in small clusters, very shortly united in a ring at base, \pm persistent, slender, smooth towards base, barbellate upwards, the terminal barbellae usually clavate.

This genus is similar in floral characters to *Ozothamnus*. The latter genus differs principally in habit (its species being either shrubs or subshrubs), in the size and arrangement of the capitula, and in not being ectomycorrhizal. The achenes of *Ozothamnus* have short narrow duplex hairs whereas in *Argentipallium* they are very short and clavate to obovoid. In *Ozothamnus* there is considerable

variation in the form and length of the anther tails, whereas in *Argentipallium* the anther tails are long, stout (weak in *A. niveum*), and shortly branched.

Etymology. The name is derived from the Latin words *argenteus*, silvery and *pallium*, a mantle, in allusion to the silvery indumentum that characteristically covers the leaves and branches of species of this genus.

Key to species

1. Stem leaves small, linear, clustered in axillary fascicles *A. niveum*
1. Stem leaves solitary
 2. Tufted herb; flower head solitary on scape-like stems *A. dealbatum*
 2. Open perennial or small shrub; flower heads clustered or solitary
 3. Flower heads to 15 mm diameter, frequently corymbose; indumentum woolly.
 4. Leaves thick-woolly all over *A. blandowskianum*
 4. Leaves closely woolly below, glabrescent above *A. spiceri*
 3. Flower heads 10-25 mm diameter, solitary; indumentum a compact silky sheen
 5. Leaves narrow-oblong to linear, 5-20(60) mm long; branches never spinescent; flower heads 15-25 mm diameter, not subtended by leaves; achenes sparsely papillose *A. obtusifolium*
 5. Leaves linear or scale-like, to 8 mm long; branches sometimes spinescent; flower heads to 15 mm diameter, subtended by reduced foliage leaves; achenes densely papillose *A. tephrodes*

Argentipallium blandowskianum (Steetz ex Sonder) Paul G. Wilson, comb. nov.

Helichrysum blandowskianum Steetz ex Sonder, *Linnaea* 25:512 (1853). *Type*: 'Encounter Bay' *n.v.*

Helichrysum blandowskianum var. *dichroon* Sonder, *Linnaea* 25:512 (1852). *Type*: 'Nov.-Holl. austro-occidentalis' *n.v.*

Distribution. Found in south eastern South Australia and western Victoria.

I have not been able to find the types of the above two names but the original descriptions are clear and there is little doubt about their application.

This species differs from the other species of the genus in having a semi-terete stipe to the intermediate involucre bracts, in having a longer and more slender corolla with large ellipsoid glands on the lobes, and in the achene having a translucent pericarp with thickened radial walls and a thin weak testa. It has some similarities to the *Helichrysum elatum* group but differs profoundly in that the bract-stipe does not bear the glandular hairs that are found in *H. elatum*, and the achenial nerves are medially (not laterally) placed. In addition it is ectomycorrhizal whereas species of the *H. elatum* group are not (Warcup 1990).

Argentipallium dealbatum (Labill.) Paul G. Wilson, comb. nov.

Helichrysum dealbatum Labill., Nov. Holl. Pl. Sp. 2:45 t. 190 (1806). - *Gnaphalium niveum* Poir., Encycl. Meth. Bot. Suppl. 2:808(1812) *nom. illeg. non* L. (1753) - *G. dealbatum* (Labill.) Schultz-Bip., Bot. Zeitung 3:171(1875) *nom. illeg. non* Thunb. (1800). Type citation: 'Habitat in capite Van-Diemen'. Type *n.v.*

Distribution. Southern Victoria and Tasmania.

Argentipallium niveum (Steetz) Paul G. Wilson, comb. nov. (Figure 3)

Helipterum niveum Steetz in Lehm., Pl. Preiss. 1:475(1845). Type: In Nova Hollandia (Swan River Colonia) in solo sublimoso inferioris sinus regis Georgii III, Oct. 1840, *L. Preiss* 11 (holo: MEL).

[*Helichrysum obtusifolium* auct. non Sonder: Benth., Fl. Austral. 3:619(1867) *p.p.*; Grieve & Blackall, How to know Western Australian Wildflowers 840(1975).]

Distribution. South-west region of Western Australia.

Chromosome number: $n = 12$ *vide* Turner (1970) as *Helipterum obtusifolium*.

Argentipallium obtusifolium (Sonder) Paul G. Wilson, comb. nov.

Helichrysum obtusifolium Sonder, Linnaea 25:513(1853). Type: Encounter Bay, South Australia, November, *F. Mueller* (holo: MEL 604819).

Distribution. Southern South Australia, western and southern Victoria, south coast of New South Wales, and northern Tasmania.

Note. There is considerable difference in the habit and capitulum shape and size in different geographical variants of this species. In Kangaroo Island, South Australia, the plants are small, 6-12 cm high, the involucre short (3-4 mm high) and urceolate, the laminae to the involucre bracts 3-4 mm long, and the pappus bristles white with clavate cilia at the apex. This variant resembles the Western Australian species, *A. tephrodes*, which differs most obviously in having smaller leaves and densely papillose achenes. A rather similar plant is also found on the Fleurieu Peninsula. In south-eastern South Australia, Victoria, and in New South Wales the plants are larger with longer leaves, larger and hemispherical involucre, laminae to 10 mm long, and the pappus bristles with translucent acute terminal cilia. However, since the variants appear to grade into each other I have not attempted to provide an infra-specific classification.

Argentipallium spiceri (F. Muell.) Paul G. Wilson, comb. nov.

Helichrysum spiceri F. Muell., Fragm. 11:47(1878). Type: Near Longley, Tasmania, *A. Simson* (holo: MEL).

[*Helichrysum obtusifolium* auct. non F. Muell.: Rodway, Tasmanian Flora 87(1903) *p.p.*]

Distribution. Southern Tasmania.

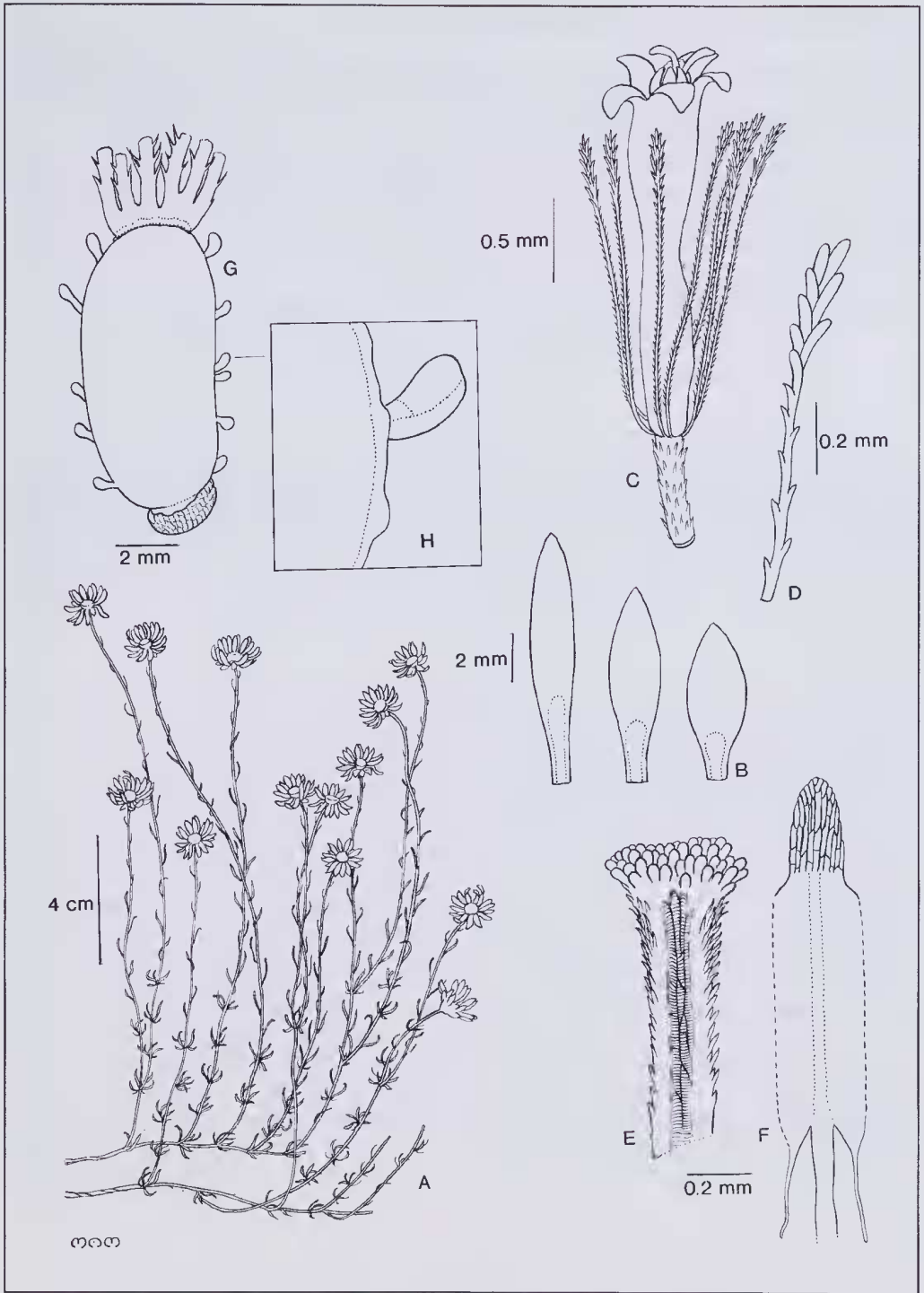


Figure 3. *Argentipallium niveum*. A - habit; B - inner, intermediate and outer involucre bracts; C - floret; D - apex of pappus bristle; E - style apex; F - anther; G - achene; H - duplex hair on pericarp. From P.G. Wilson 7871.

Argentipallium tephrodes (Turcz.) Paul G. Wilson, comb. nov.

Ozothamnus tephrodes Turcz., Bull. Soc. Imp. Naturalistes Moscou 24(2):79(1851). - *Helichrysum obtusifolium* var. *tephrodes* (Turcz.) Benth., Fl. Austral. 3:619(1867). Type: *J. Drummond* 5th coll. no. 385 (holo: KW, photo seen; iso: MEL, PERTH).

Helichrysum obtusifolium var. *squamiger* Benth., Fl. Austral. 3:619(1867). Type citation: 'Near Oldfield river, Maxwell'. Syntypes: In tea tree salt flats near Oldfield R., *G. Maxwell* (MEL); Melaleuca flats, near Oldfield R., *G. Maxwell* (MEL).

Distribution. Southern Western Australia from Fitzgerald River east to Israelite Bay.

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